

# PATENT ABSTRACTS OF JAPAN

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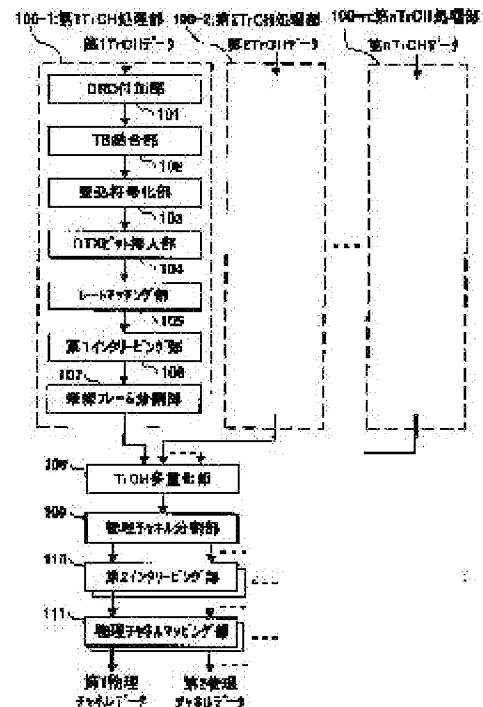
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## (54) DATA TRANSMITTER, DATA RECEIVER, DATA TRANSMISSION METHOD AND DATA RECEPTION METHOD

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a data transmitter, a data receiver, a data transmission method and a data reception method by which rate matching processing is always applied to a bit length of a prescribed size thereby preventing the processing quantity from being increased even when number of transport blocks sent through a transport channel and a transport block size are changed.

**SOLUTION:** A CRC attach section 101 through a convolution coding section 103 apply coding processing to transport channel data (TrCH data) for error correction. A DTX(Discontinuous Transmission) bit insertion section 104 inserts DTX bits to fill in a bit number of a difference to the TrCH data when the number of the TrCH data after coding processing has the difference, that is, is less than a predetermined maximum value. A rate matching section 105 decides number of bits for mapping the TrCH data after the insertion with data on a physical channel having a spread rate designated by a host layer. A physical channel mapping section 111 maps the TrCH data of the bit number with the data on the physical channel.



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**CLAIMS**

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[Claim(s)]

[Claim 1] The data source comprising:

A means to perform coding processing for an error correction to two or more transport channel data.

A means to insert a DTX bit for burying the number of bits of the difference in transport channel data when the number of bits of transport channel data after said coding processing is less than the maximum defined beforehand.

A means to perform rate matching which determines the number of bits which maps transport channel data after said insertion as a physical channel of a dispersion ratio specified from the upper layer.

A means to map transport channel data according to said number of bits on a physical channel.

[Claim 2] A means to perform coding processing for an error correction to transport channel data characterized by comprising the following, and each transport channel data after said coding processing.

A means to insert a DTX bit for burying the number of bits of that difference in transport channel data when the number of bits of this data is less than the maximum defined beforehand.

A means to perform rate matching which determines the number of bits which maps each transport channel data after said insertion as a physical channel of a dispersion ratio specified from said upper layer based on dignity of each transport channel specified from the upper layer.

A means to multiplex each transport channel data outputted from this means.

A means to map transport channel data after multiplexing according to said number of bits on a physical channel.

[Claim 3] A data receiver comprising:

A means to perform RETODE matching which returns transport channel data mapped in the data source according to claim 1 to data in front of rate matching in said data source.

A means to consider that the number of bits of that difference is a DTX bit, and to delete it when the number of bits of transport channel data after said RETODE matching is less than the maximum defined beforehand, and a means to perform decoding processing for an error correction to transport channel data outputted from this means.

[Claim 4] A data receiver comprising:

A means to separate transport channel data mapped in the data source according to claim 2.

A means to perform RETODE matching which returns each transport channel separated by this means based on dignity of each transport channel specified from the upper layer to data in front of rate matching in said data source.

A means to consider that the number of bits of the difference is a DTX bit, and to delete it when the number of bits of each transport channel data after said RETODE matching is less than the maximum defined beforehand.

A means to perform decoding processing for an error correction to each transport channel data outputted from this means.

[Claim 5] A base station device possessing the data source according to claim 1 or 2.

[Claim 6] A mobile station possessing the data receiver according to claim 3 or 4.

[Claim 7] Coding processing for an error correction is performed to two or more transport channel data, When the number of bits of transport channel data after this processing is less than the maximum defined beforehand, A DTX bit for burying the number of bits of the difference is inserted in transport channel data, Rate matching which determines the number of bits which maps transport channel data after this insertion in a physical channel of a dispersion ratio specified from the upper layer is performed, A data transmission method mapping transport channel data according to said number of bits on a physical channel.

[Claim 8] Transport channel data mapped in the data transmission method according to claim 7, RETODE matching returned to data in front of rate matching in said data transmission method is performed, When the number of bits of transport channel data after this RETODE matching is less than the maximum defined beforehand, A data receiving method performing decoding processing for an error correction to transport channel data which considered that the number of bits of that difference was a DTX bit, deleted it, and passed through this deletion.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] A mobile station of the information-and-telecommunications terminal unit etc. with which this invention was provided with the car telephone machine and the portable telephone, portable telephone function, and computer function in the mobile communications system with which the CDMA (Code Division Multiple Access) method was applied, And it is related with the data source, the data receiver and data transmission method, and data receiving method which are applied to a mobile station, the base station device which performs radio, etc.

[0002]

[Description of the Prior Art] That the channel-coding method in the mobile communication system of the third generation was indicated to be to TS25.212 of 3GPP is known. Get down and about channel coding of a circuit. The art of fixed position which considers the position at the time of multiplexing two or more Transport channel (the following TrCH and notation) as immobilization, and the art of flexible position which makes a position variable are known.

[0003] The combination of the plurality TrCH received in the mobile station which gets down from a base station device and receives a line signal, In order to perform Blind Transport format detection (the following BTFD and notation) which judges the formats (the size of Transport block, the multiplexed number of Transport block, etc.) of each TrCH without explicit information, The direction which applied fixed position can make reception easy.

[0004]Drawing 5 is a block diagram showing the composition of the conventional data source.

[0005]It gets down in fixed position and the data source shown in this drawing 5 performs channel-coding processing. However, although the following explanation shows the case where convolutional code-ized processing of the coding rates 1/3 is applied, as coding processing of an error correction, it is also the same as when convolutional code-ized processing of the coding rates 1/2 and Turbo coding processing of the coding rates 1/3 are applied.

[0006]this data source -- the [ the 1st - ] -- as opposed to each of nTrCH data -- the [ the 1st of an identical configuration - ] -- in each of the nTrCH treating part 500-1 - 500-n, Processing explained by the after-mentioned is performed by the CRC adjunct 501, the TB (Transport block) bond part 502, the convolutional code-ized part 503, the rate matching part 504, the DTX bit inserting part 505, the 1st interleaving part 506, and the radio frame dividing part 507. Then, TrCH multiplexing is performed by the TrCH multiplexing part 508, and processing explained by the after-mentioned in the physical channel dividing part 509, the 2nd interleaving part 510, and the physical channel-mapping part 511 is performed as a single data row.

[0007]the [ first, / the 1st - ] -- operation of the nTrCH treating part 500-1 - 500-n is explained on behalf of the 1st TrCH treating part 500-1.

[0008]In the CRC adjunct 501, addition of a CRC bit to each TB in TrCH data is performed.

[0009]In the TB bond part 502, TB to which the CRC bit was added by the CRC adjunct 501 is combined to a single data row.

[0010]In the convolutional code-ized part 503, after adding an 8-bit tail bit to the data row from the TB bond part 502, convolutional code-ized processing of the coding rates 1/3 is performed.

[0011]In the rate matching part 504, the number of bits which maps a TrCH data row is determined as the physical channel of the dispersion ratio specified from the upper layer based on RM (Rate matching attribute) specified from the upper layer.

[0012]This determined number of bits is used by mapping in the physical channel-mapping part 511. A rate matching algorithm shall follow what was indicated to TS25.212.

[0013]The variation of the number of bits before and behind rate matching, in TrCH data -- an interleave cycle -- {-- it being determined on the basis of the case where the transmission data volume of per TTI(Transmission Time Interval)} serves as the maximum, and, the [ for example, ] -- the number of bits from which data volume  $R(N^{TTI}_i)$  after the rate matching to transmission data volume  $N^{TTI}_i$  per TTI of iTrCH data becomes  $R(N^{TTI}_i)/N^{TTI}_i=C_i$  is outputted.

[0014]In the DTX bit inserting part 505, when the number of bits after the rate matching of TrCH data is less than the maximum, a part for the number of bits of the difference is inserted as a DTX (Discontinuous Transmission) bit.

[0015]In the 1st interleaving part 506, block interleave over between two or more radio frames is performed to the TrCH data from the DTX bit inserting part 505.

[0016]In the radio frame dividing part 507, division into every data row transmitted by the radio frame for 10 ms each is performed.

[0017]the [ thus, / the 1st - ] -- every processed by the nTrCH treating part 500-1 - 500-n -- TrCH data is outputted to the TrCH multiplexing part 508.

[0018]Multiplexing processing of each TrCH data is performed in the TrCH multiplexing part 508.

[0019]In the physical channel dividing part 509, the transmission data to each code in the case of performing multi-code transfer is divided to multiplexing data.

[0020]In the 2nd interleaving part 510, block interleave within the data transmitted within 10 ms is performed to the output data from the physical channel dividing part 509.

[0021]In the physical channel-mapping part 511, the data row from the 2nd interleaving part 510 is arranged to up to a physical channel according to the above-mentioned number of bits.

[0022]here -- the -- the data flow in the convolutional code-ized part 503, the rate matching part 504, and the DTX bit inserting part 505 which process iTrCH data is shown in drawing 6, and the explanation is given.

[0023]To the convolutional code-ized processing in the convolutional code-ized part 503, the number of bits inputted at the time of TF(Transport Format) =j which becomes settled in the size of TB, the multiplexed number of TB, etc. is made into  $N_{i \text{ and } j}$ , as shown in drawing 6 (a).

[0024]Here,  $N_{i \text{ and } j}$  shall contain a tail bit. At this time, from the convolutional code-ized part 503, as shown in (b), the bit string of  $N_{i \text{ and } j} \times 3$  is outputted.

[0025]In the rate matching processing in the rate matching part 504, as shown in (c), bit manipulation which becomes  $x(N_{i, j} \times 3) \text{ Ci} = (N_{i, j} \times 3) + \Delta N_{i \text{ and } j}$  is performed for every TF.

[0026]In the DTX bit inserting part 505, as shown in (d), the DTX bit for [ used as  $N_{i, \text{DTX}} = (N_{i, \text{max}} \times 3) + \Delta N_{i, \text{max}} - (N_{i, j} \times 3) + \Delta N_{i, \text{and } j}$  ] the number of bits is inserted.

[0027]

[Problem(s) to be Solved by the Invention]However, in the conventional device, since it is necessary to the data row of the different number of bits for every TF of each TrCH to perform rate matching processing of a pattern which is different in each, there is a problem that a throughput will increase.

[0028]Since it is necessary to perform RETODE conducts matching corresponding to all the TF when getting down and performing BTDF in channel decoding in the reception of a circuit especially, a throughput will increase.

[0029]This invention is made in view of this point, and is a thing.

the purpose, even if the number of transport blocks and transport block size which are come out of and transmitted change, It is providing the data source and the data receiver which can always perform rate matching processing to the bit length of certain size, and can prevent increase of a throughput by this and a data transmission method, and a data receiving method.

[0030]

[Means for Solving the Problem]A means by which the data source of this invention performs coding processing for an error correction to two or more transport channel data, A means to insert a DTX bit for burying the number of bits of the difference in transport channel data when the number of bits of transport channel data after said coding processing is less than the maximum defined beforehand, A means to perform rate matching which determines the number of bits which maps transport channel data after said insertion as a physical channel of a dispersion ratio specified from the upper layer, Composition possessing a means to map transport channel data according to said number of bits on a physical channel is taken.

[0031]According to this composition, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, rate matching processing can always be performed to bit length of certain size, and increase of a throughput can be prevented by this.

[0032]In a means by which the data source of this invention performs coding processing for an error correction to transport channel data, and each transport channel data after said coding processing, A means to insert a DTX bit for burying the number of bits of that difference in transport channel data when the number of bits of this data is less than the maximum defined beforehand, Based on dignity of each transport channel specified from the upper layer, A means to perform rate matching which determines the number of bits which maps each transport

channel data after said insertion as a physical channel of a dispersion ratio specified from said upper layer, Composition possessing a means to multiplex each transport channel data outputted from this means, and a means to map transport channel data after multiplexing according to said number of bits on a physical channel is taken.

[0033]According to this composition, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, rate matching processing can always be performed to bit length of certain size, and increase of a throughput can be prevented by this.

[0034]A means to perform RETODE matching which returns transport channel data in which a data receiver of this invention was mapped in the data source of the above-mentioned composition to data in front of rate matching in said data source, A means to consider that the number of bits of the difference is a DTX bit, and to delete it when the number of bits of transport channel data after said RETODE matching is less than the maximum defined beforehand, Composition possessing a means to perform decoding processing for an error correction to transport channel data outputted from this means is taken.

[0035]According to this composition, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, RETODE conducts matching can always be performed to bit length of certain size, and increase of a throughput can be prevented by this.

[0036]A means to separate transport channel data in which a data receiver of this invention was mapped in the data source of the above-mentioned composition, Based on dignity of each transport channel specified from the upper layer, each transport channel separated by this means, A means to perform RETODE matching returned to data in front of rate matching in said data source, A means to consider that the number of bits of the difference is a DTX bit, and to delete it when the number of bits of each transport channel data after said RETODE matching is less than the maximum defined beforehand, Composition possessing a means to perform decoding processing for an error correction to each transport channel data outputted from this means is taken.

[0037]According to this composition, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, RETODE conducts matching can always be performed to bit length of certain size, and increase of a throughput can be prevented by this.

[0038]A base station device of this invention takes composition possessing the data source of one of the above, and the composition.

[0039]According to this composition, in a base station device, the same operation effect as one of the above and the data source of the composition can be obtained.

[0040]A mobile station of this invention takes composition possessing a data receiver of one of the above, and the composition.

[0041]According to this composition, in a mobile station, the same operation effect as one of the above and a data receiver of the composition can be obtained.

[0042]A data transmission method of this invention performs coding processing for an error correction to two or more transport channel data, When the number of bits of transport channel data after this processing is less than the maximum defined beforehand, A DTX bit for burying the number of bits of the difference is inserted in transport channel data, Rate matching which determines the number of bits which maps transport channel data after this insertion in a physical channel of a dispersion ratio specified from the upper layer is performed, and transport channel data according to said number of bits was mapped on a physical channel.

[0043]According to this method, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, rate matching processing can always be performed to bit length of certain size, and increase of a throughput can be prevented by this.

[0044]A data receiving method of this invention transport channel data mapped in the above-mentioned data transmission method, RETODE matching returned to data in front of rate matching in said data transmission method is performed, When the number of bits of transport channel data after this RETODE matching was less than the maximum defined beforehand, it considers that the number of bits of that difference is a DTX bit, it is deleted, and it was made to perform decoding processing for an error correction to transport channel data which passed through this deletion.

[0045]According to this method, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, RETODE conducts matching can always be performed to bit length of certain size, and increase of a throughput can be prevented by this.

[0046]

[Embodiment of the Invention]Hereafter, an embodiment of the invention is described in detail with reference to drawings.

[0047](Embodiment 1) Drawing 1 is a block diagram showing the composition of the data source concerning the embodiment of the invention 1.

[0048]It gets down in fixed position and the data source shown in this drawing 1 performs channel-coding processing. However, although the following explanation shows the case where convolutional code-ized processing of the coding rates 1/3 is applied, as coding processing of an error correction, it is also the same as when convolutional code-ized processing of the coding rates 1/2 and Turbo coding processing of the coding rates 1/3 are applied.

[0049]this data source -- the [ the 1st - ] -- as opposed to each of nTrCH data -- the [ the 1st of an identical configuration - ] -- in each of the nTrCH treating part 100-1 - 100-n, Processing explained by the after-mentioned is performed by the CRC adjunct 101, the TB bond part 102, the convolutional code-ized part 103, the DTX bit inserting part 104, the rate matching part 105, the 1st interleaving part 106, and the radio frame dividing part 107.

[0050]Then, TrCH multiplexing is performed by the TrCH multiplexing part 108, and processing explained by the after-mentioned in the physical channel dividing part 109, the 2nd interleaving part 110, and the physical channel-mapping part 111 is performed as a single data row.

[0051]the [ first, / the 1st - ] -- operation of the nTrCH treating part 100-1 - 100-n is explained on behalf of the 1st TrCH treating part 100-1.

[0052]In the CRC adjunct 101, addition of a CRC bit to each TB in TrCH data is performed.

[0053]In the TB bond part 102, TB to which the CRC bit was added by the CRC adjunct 101 is combined to a single data row.

[0054]In the convolutional code-ized part 103, after adding an 8-bit tail bit to the data row from the TB bond part 102, convolutional code-ized processing of the coding rates 1/3 is performed.

[0055]In the DTX bit inserting part 104, when the number of bits of the TrCH data from the convolutional code-ized part 503 is less than the maximum, a part for the number of bits of the difference is inserted as a DTX bit. For this reason, the number of bits after the DTX bit inserting of TrCH data becomes always equal to the number of bits in TF from which the number of TB size xTB serves as the maximum.

[0056]In the rate matching part 105, the number of bits which maps a TrCH data row is determined as the physical channel of the dispersion ratio specified from the upper layer based on RM specified from the upper layer.

[0057]This determined number of bits is used by mapping in the physical channel-mapping part 111. A rate matching algorithm shall follow what was indicated to TS25.212.

[0058]In TrCH, since the data row of the maximum number of bits is always inputted, the variation of the number of bits before and behind rate matching will perform only rate matching processing to the case where the transmission data volume of per the 1st interleave cycle (TTI) serves as the maximum.

[0059]In the 1st interleaving part 106, block interleave over between two or more radio frames is performed to the TrCH data from the rate matching part 105.

[0060]In the radio frame dividing part 107, division into every data row transmitted by the radio frame for 10 ms each is performed.

[0061]the [ thus, / the 1st - ] -- every processed by the nTrCH treating part 100-1 - 100-n -- TrCH data is outputted to the TrCH multiplexing part 108.

[0062]Multiplexing processing of each TrCH data is performed in the TrCH multiplexing part 108.

[0063]In the physical channel dividing part 109, the transmission data to each code in the case of performing multi-code transfer is divided to multiplexing data.

[0064]In the 2nd interleaving part 110, block interleave within the data transmitted within 10 ms is performed to the output data from the physical channel dividing part 109.

[0065]In the physical channel-mapping part 111, the data row from the 2nd interleaving part 110 is arranged to up to a physical channel according to the above-mentioned number of bits.

[0066]here -- the -- the data flow in the convolutional code-ized part 103, the DTX bit inserting part 104, and the rate matching part 105 which process iTrCH data is shown in drawing 2, and the explanation is given.

[0067]To the convolutional code-ized processing in the convolutional code-ized part 103, the number of bits inputted at the time of  $TF=j$  which becomes settled in the size of TB, the multiplexed number of TB, etc. is made into  $N_{i \text{ and } j}$ , as shown in drawing 2 (a).

[0068]Here,  $N_{i \text{ and } j}$  shall contain a tail bit. At this time, from the convolutional code-ized part 103, as shown in (b), the bit string of  $N_{i \text{ and } j} \times 3$  is outputted.

[0069]In the DTX bit inserting part 104, as shown in (c), the DTX bit for [ used as  $N_{i \text{ and } DTX} = (N_{i, \text{max}} \times 3) - (N_{i, j} \times 3)$  ] the number of bits is inserted.

[0070]In the rate matching part 105, since  $N_{i \text{ and } \text{max}} \times 3$  becomes an input bit number in common to all the TF, as shown in (d), only bit manipulation which becomes  $(N_{i, \text{max}} \times 3) + \Delta N_{i \text{ and } \text{max}}$  is performed.

[0071]Thus, in channel coding of the going-down circuit which multiplexes a transport channel in fixed position according to the data source of Embodiment 1, DTX bit inserting is performed first and it was made to perform rate matching processing after the coding processing for an error correction after that.

[0072]By this, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, rate matching processing can always be performed to the bit length of certain size. Increase of a throughput can be prevented by this.

[0073](Embodiment 2) Drawing 3 is a block diagram showing the composition of the data receiver concerning the embodiment of the invention 2.

[0074]It gets down in fixed position and the data receiver shown in this drawing 3 shows a channel decoding method. However, although the following explanation shows the case where convolutional code-ized processing of the coding rates 1/3 is applied, as coding processing of an error correction, it is also the same as when convolutional code-ized processing of the coding



rates 1/2 and Turbo coding processing of the coding rates 1/3 are applied.

[0075]In this data receiver, each physical channel data transmitted from the data source of the above-mentioned Embodiment 1 is received, processing explained by the after-mentioned by the physical channel demapping part 301, the 2nd Dinter leaving part 302, the physical channel bond part 303, and the TrCH separation part 304 is performed -- the [ the 1st of an identical configuration - ] -- it is outputted to the nTrCH treating part 305-1 - 305-n.

[0076]And in each TrCH treating part 305-1 - 305-n, Processing explained by the after-mentioned by the radio frame bond part 306, the 1st Dinter leaving part 307, the RETODE matching part 308, the DTX bit cutout 309, the Viterbi decoding part 310, the TB separation part 311, and the CRC judgment part 312 is performed, the [ the 1st - ] -- nTrCH data is outputted.

[0077]In the physical channel demapping part 301, a data row is extracted from on each physical channel.

[0078]In the 2nd Dinter leaving part 302, the block DEINTA reeve within the data transmitted within 10 ms is performed to the output data from the physical channel demapping part 301.

[0079]In the physical channel bond part 303, the transmission data by which the block DEINTA reeve was carried out is combined from each code in the case of performing multi-code transfer.

[0080]the data combined by the physical channel bond part 303 in the TrCH separation part 304 -- the [ the 1st - ] -- it separates into nTrCH data and outputs to the TrCH treating part 305-1 corresponding to this each - 305-n.

[0081]Next, operation of each TrCH treating part 305-1 - 305-n is explained on behalf of the 1st TrCH treating part 305-1.

[0082]In the radio frame bond part 306, combination to a part for the TTI cycle of the data row transmitted by the radio frame for 10 ms each is performed.

[0083]In the 1st Dinter leaving part 307, the block DEINTA reeve over between two or more radio frames is performed to the combination data in the radio frame bond part 306.

[0084]As opposed to the data by which the block DEINTA reeve was carried out in the RETODE matching part 308, Based on RM specified from the upper layer, operation returned to the data row in front of the rate matching of a transmitting agency is performed from the data row of TrCH mapped by TS25.212 to the physical channel of the dispersion ratio specified from the upper layer according to the rate matching algorithm of a statement.

[0085]In TrCH, since the data row of the maximum number of bits is always inputted, the variation of the number of bits before and after RETODE matching will perform only RETODE conducts matching to the case where the transmission data volume of per an interleave cycle (TTI) serves as the maximum.

[0086]In the DTX bit cutout 309, when the number of bits of the TrCH data from the RETODE matching part 308 is less than the maximum, it considers that a part for the number of bits of the difference is a DTX bit, and it is deleted.

[0087]Here, the number of bits before DTX bit deletion of TrCH data becomes always equal to the number of bits in TF from which the number of TB size xTB serves as the maximum.

[0088]In the Viterbi decoding part 310, Viterbi decoding processing (coding rates 1/3) to the data row from the DTX bit cutout 309 is performed. At this time, 8 bits of ends of a data row are treated as a tail bit.

[0089]In the TB separation part 311, the data row of TrCH decoded by the Viterbi decoding part 310 is divided into TB unit.

[0090]In the CRC judgment part 312, CRC bit decision processing to TB from the TB separation part 311 is performed. The 1st TrCH data is outputted by this.

[0091]here -- the -- the data flow in the RETODE matching part 308, the DTX bit cutout 309, and the Viterbi decoding part 310 which process the data of iTrCH is shown in drawing 4, and the explanation is given.

[0092]In the RETODE matching part 308, since  $N_i$  shown in drawing 4 (a),  $\max x3 + \Delta N_i$ , and  $\max$  become an input bit number in common to all the TF, only bit manipulation which is set to  $(N_i, \max x3)$  is performed.

[0093]In the DTX bit cutout 309, as shown in (b), the DTX bit for [ used as  $N_i$  and  $DTX = (N_i, \max x3) - (N_i, j x3)$  ] the number of bits is deleted.

[0094]To the Viterbi decoding processing in the Viterbi decoding part 310, as shown in (c), the data row of  $N_i$  and  $j x3$  is inputted, and as shown in (d), the data row of  $N_i$  and  $j$  is obtained as an output after an error correction (a tail bit is included).

[0095]Thus, according to the data receiver of Embodiment 2, it counters with the data source of the above-mentioned Embodiment 1, DTX bit deletion is performed after RETODE conducts matching, and it was made to perform decoding processing for an error correction.

[0096]By this, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, RETODE conducts matching can always be performed to the bit length of certain size. Increase of a throughput can be prevented by this.

[0097]In performing BTFD which used CRC of the statement for Annex A.1.2 of TS25.212 especially, Since it is not necessary to perform RETODE conducts matching for every number of transmitted bits of the TTI cycle corresponding to all the TF which TrCH of a determination object can take, the amount of receptions is reducible.

[0098]

[Effect of the Invention]As explained above, even if the number of transport blocks and transport block size which are transmitted by a transport channel change according to this invention, Rate matching processing can always be performed to the bit length of certain size, and increase of a throughput can be prevented by this.

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## TECHNICAL FIELD

[Field of the Invention]A mobile station of the information-and-telecommunications terminal unit etc. with which this invention was provided with the car telephone machine and the portable telephone, portable telephone function, and computer function in the mobile communications system with which the CDMA (Code Division Multiple Access) method was applied, And it is related with the data source, the data receiver and data transmission method, and data receiving method which are applied to a mobile station, the base station device which performs radio, etc.

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## PRIOR ART

[Description of the Prior Art]That the channel-coding method in the mobile communication system of the third generation was indicated to be to TS25.212 of 3GPP is known. Get down and about channel coding of a circuit. The art of fixed position which considers the position at the time of multiplexing two or more Transport channel (the following TrCH and notation) as immobilization, and the art of flexible position which makes a position variable are known.

[0003]The combination of the plurality TrCH received in the mobile station which gets down from a base station device and receives a line signal, In order to perform Blind Transport format detection (the following BTFD and notation) which judges the formats (the size of Transport

block, the multiplexed number of Transport block, etc.) of each TrCH without explicit information, The direction which applied fixed position can make reception easy.

[0004]Drawing 5 is a block diagram showing the composition of the conventional data source.

[0005]It gets down in fixed position and the data source shown in this drawing 5 performs channel-coding processing. However, although the following explanation shows the case where convolutional code-ized processing of the coding rates 1/3 is applied, as coding processing of an error correction, it is also the same as when convolutional code-ized processing of the coding rates 1/2 and Turbo coding processing of the coding rates 1/3 are applied.

[0006]this data source -- the [ the 1st - ] -- as opposed to each of nTrCH data -- the [ the 1st of an identical configuration - ] -- in each of the nTrCH treating part 500-1 - 500-n, Processing explained by the after-mentioned is performed by the CRC adjunct 501, the TB (Transport block) bond part 502, the convolutional code-ized part 503, the rate matching part 504, the DTX bit inserting part 505, the 1st interleaving part 506, and the radio frame dividing part 507. Then, TrCH multiplexing is performed by the TrCH multiplexing part 508, and processing explained by the after-mentioned in the physical channel dividing part 509, the 2nd interleaving part 510, and the physical channel-mapping part 511 is performed as a single data row.

[0007]the [ first, / the 1st - ] -- operation of the nTrCH treating part 500-1 - 500-n is explained on behalf of the 1st TrCH treating part 500-1.

[0008]In the CRC adjunct 501, addition of a CRC bit to each TB in TrCH data is performed.

[0009]In the TB bond part 502, TB to which the CRC bit was added by the CRC adjunct 501 is combined to a single data row.

[0010]In the convolutional code-ized part 503, after adding an 8-bit tail bit to the data row from the TB bond part 502, convolutional code-ized processing of the coding rates 1/3 is performed.

[0011]In the rate matching part 504, the number of bits which maps a TrCH data row is determined as the physical channel of the dispersion ratio specified from the upper layer based on RM (Rate matching attribute) specified from the upper layer.

[0012]This determined number of bits is used by mapping in the physical channel-mapping part 511. A rate matching algorithm shall follow what was indicated to TS25.212.

[0013]The variation of the number of bits before and behind rate matching, in TrCH data -- an interleave cycle -- {-- it being determined on the basis of the case where the transmission data volume of per TTI(Transmission Time Interval)} serves as the maximum, and, the [ for example, ] -- the number of bits from which data volume  $R(N^{TTI}_i)$  after the rate matching to transmission data volume  $N^{TTI}_i$  per TTI of iTrCH data becomes  $R(N^{TTI}_i)/N^{TTI}_i=C_i$  is outputted.

[0014]In the DTX bit inserting part 505, when the number of bits after the rate matching of TrCH data is less than the maximum, a part for the number of bits of the difference is inserted as a DTX (Discontinuous Transmission) bit.

[0015]In the 1st interleaving part 506, block interleave over between two or more radio frames is performed to the TrCH data from the DTX bit inserting part 505.

[0016]In the radio frame dividing part 507, division into every data row transmitted by the radio frame for 10 ms each is performed.

[0017]the [ thus, / the 1st - ] -- every processed by the nTrCH treating part 500-1 - 500-n -- TrCH data is outputted to the TrCH multiplexing part 508.

[0018]Multiplexing processing of each TrCH data is performed in the TrCH multiplexing part 508.

[0019]In the physical channel dividing part 509, the transmission data to each code in the case of performing multi-code transfer is divided to multiplexing data.

[0020]In the 2nd interleaving part 510, block interleave within the data transmitted within 10 ms is performed to the output data from the physical channel dividing part 509.

[0021]In the physical channel-mapping part 511, the data row from the 2nd interleaving part 510 is arranged to up to a physical channel according to the above-mentioned number of bits.

[0022]here -- the -- the data flow in the convolutional code-ized part 503, the rate matching part 504, and the DTX bit inserting part 505 which process iTrCH data is shown in drawing 6, and the explanation is given.

[0023]To the convolutional code-ized processing in the convolutional code-ized part 503, the number of bits inputted at the time of TF(Transport Format) =j which becomes settled in the size of TB, the multiplexed number of TB, etc. is made into  $N_{i \text{ and } j}$ , as shown in drawing 6 (a).

[0024]Here,  $N_{i \text{ and } j}$  shall contain a tail bit. At this time, from the convolutional code-ized part 503, as shown in (b), the bit string of  $N_{i \text{ and } j} \times 3$  is outputted.

[0025]In the rate matching processing in the rate matching part 504, as shown in (c), bit manipulation which becomes  $x(N_{i, j} \times 3)$   $C_i = (N_{i, j} \times 3) + \Delta N_{i \text{ and } j}$  is performed for every TF.

[0026]In the DTX bit inserting part 505, as shown in (d), the DTX bit for [ used as  $N_{i, DTX} = (N_{i, \max} \times 3) + \Delta N_{i, \max} - (N_{i, j} \times 3) + \Delta N_{i, \text{ and } j}$  ] the number of bits is inserted.

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## EFFECT OF THE INVENTION

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[Effect of the Invention]As explained above, even if the number of transport blocks and transport block size which are transmitted by a transport channel change according to this invention, Rate matching processing can always be performed to the bit length of certain size, and increase of a throughput can be prevented by this.

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## TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention]However, in the conventional device, since it is necessary to the data row of the different number of bits for every TF of each TrCH to perform rate matching processing of a pattern which is different in each, there is a problem that a throughput will increase.

[0028]Since it is necessary to perform RETODE conducts matching corresponding to all the TF when getting down and performing BTDF in channel decoding in the reception of a circuit especially, a throughput will increase.

[0029]This invention is made in view of this point, and is a thing.

the purpose, even if the number of transport blocks and transport block size which are come out of and transmitted change, It is providing the data source and the data receiver which can always perform rate matching processing to the bit length of certain size, and can prevent increase of a throughput by this and a data transmission method, and a data receiving method.

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## MEANS

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[Means for Solving the Problem]A means by which the data source of this invention performs coding processing for an error correction to two or more transport channel data, A means to insert a DTX bit for burying the number of bits of the difference in transport channel data when the number of bits of transport channel data after said coding processing is less than the maximum defined beforehand, A means to perform rate matching which determines the number

of bits which maps transport channel data after said insertion as a physical channel of a dispersion ratio specified from the upper layer, Composition possessing a means to map transport channel data according to said number of bits on a physical channel is taken.

[0031]According to this composition, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, rate matching processing can always be performed to bit length of certain size, and increase of a throughput can be prevented by this.

[0032]In a means by which the data source of this invention performs coding processing for an error correction to transport channel data, and each transport channel data after said coding processing, A means to insert a DTX bit for burying the number of bits of that difference in transport channel data when the number of bits of this data is less than the maximum defined beforehand, Based on dignity of each transport channel specified from the upper layer, A means to perform rate matching which determines the number of bits which maps each transport channel data after said insertion as a physical channel of a dispersion ratio specified from said upper layer, Composition possessing a means to multiplex each transport channel data outputted from this means, and a means to map transport channel data after multiplexing according to said number of bits on a physical channel is taken.

[0033]According to this composition, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, rate matching processing can always be performed to bit length of certain size, and increase of a throughput can be prevented by this.

[0034]A means to perform RETODE matching which returns transport channel data in which a data receiver of this invention was mapped in the data source of the above-mentioned composition to data in front of rate matching in said data source, A means to consider that the number of bits of the difference is a DTX bit, and to delete it when the number of bits of transport channel data after said RETODE matching is less than the maximum defined beforehand, Composition possessing a means to perform decoding processing for an error correction to transport channel data outputted from this means is taken.

[0035]According to this composition, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, RETODE conducts matching can always be performed to bit length of certain size, and increase of a throughput can be prevented by this.

[0036]A means to separate transport channel data in which a data receiver of this invention was mapped in the data source of the above-mentioned composition, Based on dignity of each transport channel specified from the upper layer, each transport channel separated by this means, A means to perform RETODE matching returned to data in front of rate matching in said data source, A means to consider that the number of bits of the difference is a DTX bit, and to delete it when the number of bits of each transport channel data after said RETODE matching is less than the maximum defined beforehand, Composition possessing a means to perform decoding processing for an error correction to each transport channel data outputted from this means is taken.

[0037]According to this composition, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, RETODE conducts matching can always be performed to bit length of certain size, and increase of a throughput can be prevented by this.

[0038]A base station device of this invention takes composition possessing the data source of one of the above, and the composition.

[0039]According to this composition, in a base station device, the same operation effect as one

of the above and the data source of the composition can be obtained.

[0040]A mobile station of this invention takes composition possessing a data receiver of one of the above, and the composition.

[0041]According to this composition, in a mobile station, the same operation effect as one of the above and a data receiver of the composition can be obtained.

[0042]A data transmission method of this invention performs coding processing for an error correction to two or more transport channel data, When the number of bits of transport channel data after this processing is less than the maximum defined beforehand, A DTX bit for burying the number of bits of the difference is inserted in transport channel data, Rate matching which determines the number of bits which maps transport channel data after this insertion in a physical channel of a dispersion ratio specified from the upper layer is performed, and transport channel data according to said number of bits was mapped on a physical channel.

[0043]According to this method, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, rate matching processing can always be performed to bit length of certain size, and increase of a throughput can be prevented by this.

[0044]A data receiving method of this invention transport channel data mapped in the above-mentioned data transmission method, RETODE matching returned to data in front of rate matching in said data transmission method is performed, When the number of bits of transport channel data after this RETODE matching was less than the maximum defined beforehand, it considers that the number of bits of that difference is a DTX bit, it is deleted, and it was made to perform decoding processing for an error correction to transport channel data which passed through this deletion.

[0045]According to this method, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, RETODE conducts matching can always be performed to bit length of certain size, and increase of a throughput can be prevented by this.

[0046]

[Embodiment of the Invention]Hereafter, an embodiment of the invention is described in detail with reference to drawings.

[0047](Embodiment 1) Drawing 1 is a block diagram showing the composition of the data source concerning the embodiment of the invention 1.

[0048]It gets down in fixed position and the data source shown in this drawing 1 performs channel-coding processing. However, although the following explanation shows the case where convolutional code-ized processing of the coding rates 1/3 is applied, as coding processing of an error correction, it is also the same as when convolutional code-ized processing of the coding rates 1/2 and Turbo coding processing of the coding rates 1/3 are applied.

[0049]this data source -- the [ the 1st - ] -- as opposed to each of nTrCH data -- the [ the 1st of an identical configuration - ] -- in each of the nTrCH treating part 100-1 - 100-n, Processing explained by the after-mentioned is performed by the CRC adjunct 101, the TB bond part 102, the convolutional code-ized part 103, the DTX bit inserting part 104, the rate matching part 105, the 1st interleaving part 106, and the radio frame dividing part 107.

[0050]Then, TrCH multiplexing is performed by the TrCH multiplexing part 108, and processing explained by the after-mentioned in the physical channel dividing part 109, the 2nd interleaving part 110, and the physical channel-mapping part 111 is performed as a single data row.

[0051]the [ first, / the 1st - ] -- operation of the nTrCH treating part 100-1 - 100-n is explained on behalf of the 1st TrCH treating part 100-1.

[0052]In the CRC adjunct 101, addition of a CRC bit to each TB in TrCH data is performed.

[0053]In the TB bond part 102, TB to which the CRC bit was added by the CRC adjunct 101 is combined to a single data row.

[0054]In the convolutional code-ized part 103, after adding an 8-bit tail bit to the data row from the TB bond part 102, convolutional code-ized processing of the coding rates 1/3 is performed.

[0055]In the DTX bit inserting part 104, when the number of bits of the TrCH data from the convolutional code-ized part 503 is less than the maximum, a part for the number of bits of the difference is inserted as a DTX bit. For this reason, the number of bits after the DTX bit inserting of TrCH data becomes always equal to the number of bits in TF from which the number of TB size  $\times$  TB serves as the maximum.

[0056]In the rate matching part 105, the number of bits which maps a TrCH data row is determined as the physical channel of the dispersion ratio specified from the upper layer based on RM specified from the upper layer.

[0057]This determined number of bits is used by mapping in the physical channel-mapping part 111. A rate matching algorithm shall follow what was indicated to TS25.212.

[0058]In TrCH, since the data row of the maximum number of bits is always inputted, the variation of the number of bits before and behind rate matching will perform only rate matching processing to the case where the transmission data volume of per the 1st interleave cycle (TTI) serves as the maximum.

[0059]In the 1st interleaving part 106, block interleave over between two or more radio frames is performed to the TrCH data from the rate matching part 105.

[0060]In the radio frame dividing part 107, division into every data row transmitted by the radio frame for 10 ms each is performed.

[0061]the [ thus, / the 1st - ] -- every processed by the nTrCH treating part 100-1 - 100-n -- TrCH data is outputted to the TrCH multiplexing part 108.

[0062]Multiplexing processing of each TrCH data is performed in the TrCH multiplexing part 108.

[0063]In the physical channel dividing part 109, the transmission data to each code in the case of performing multi-code transfer is divided to multiplexing data.

[0064]In the 2nd interleaving part 110, block interleave within the data transmitted within 10 ms is performed to the output data from the physical channel dividing part 109.

[0065]In the physical channel-mapping part 111, the data row from the 2nd interleaving part 110 is arranged to up to a physical channel according to the above-mentioned number of bits.

[0066]here -- the -- the data flow in the convolutional code-ized part 103, the DTX bit inserting part 104, and the rate matching part 105 which process iTrCH data is shown in drawing 2, and the explanation is given.

[0067]To the convolutional code-ized processing in the convolutional code-ized part 103, the number of bits inputted at the time of  $TF=j$  which becomes settled in the size of TB, the multiplexed number of TB, etc. is made into  $N_{i \text{ and } j}$ , as shown in drawing 2 (a).

[0068]Here,  $N_{i \text{ and } j}$  shall contain a tail bit. At this time, from the convolutional code-ized part 103, as shown in (b), the bit string of  $N_{i \text{ and } j} \times 3$  is outputted.

[0069]In the DTX bit inserting part 104, as shown in (c), the DTX bit for [ used as  $N_{i \text{ and } DTX} = (N_{i, \text{max}} \times 3) - (N_{i, j} \times 3)$  ] the number of bits is inserted.

[0070]In the rate matching part 105, since  $N_{i \text{ and } \text{max}} \times 3$  becomes an input bit number in common to all the TF, as shown in (d), only bit manipulation which becomes  $(N_{i, \text{max}} \times 3) + \Delta N_{i \text{ and } \text{max}}$  is performed.

[0071]Thus, in channel coding of the going-down circuit which multiplexes a transport channel

in fixed position according to the data source of Embodiment 1, DTX bit inserting is performed first and it was made to perform rate matching processing after the coding processing for an error correction after that.

[0072]By this, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, rate matching processing can always be performed to the bit length of certain size. Increase of a throughput can be prevented by this.

[0073](Embodiment 2) Drawing 3 is a block diagram showing the composition of the data receiver concerning the embodiment of the invention 2.

[0074]It gets down in fixed position and the data receiver shown in this drawing 3 shows a channel decoding method. However, although the following explanation shows the case where convolutional code-ized processing of the coding rates 1/3 is applied, as coding processing of an error correction, it is also the same as when convolutional code-ized processing of the coding rates 1/2 and Turbo coding processing of the coding rates 1/3 are applied.

[0075]In this data receiver, each physical channel data transmitted from the data source of the above-mentioned Embodiment 1 is received, processing explained by the after-mentioned by the physical channel demapping part 301, the 2nd Dinter leaving part 302, the physical channel bond part 303, and the TrCH separation part 304 is performed -- the [ the 1st of an identical configuration - ] -- it is outputted to the nTrCH treating part 305-1 - 305-n.

[0076]And in each TrCH treating part 305-1 - 305-n, Processing explained by the after-mentioned by the radio frame bond part 306, the 1st Dinter leaving part 307, the RETODE matching part 308, the DTX bit cutout 309, the Viterbi decoding part 310, the TB separation part 311, and the CRC judgment part 312 is performed, the [ the 1st - ] -- nTrCH data is outputted.

[0077]In the physical channel demapping part 301, a data row is extracted from on each physical channel.

[0078]In the 2nd Dinter leaving part 302, the block DEINTA reeve within the data transmitted within 10 ms is performed to the output data from the physical channel demapping part 301.

[0079]In the physical channel bond part 303, the transmission data by which the block DEINTA reeve was carried out is combined from each code in the case of performing multi-code transfer.

[0080]the data combined by the physical channel bond part 303 in the TrCH separation part 304 -- the [ the 1st - ] -- it separates into nTrCH data and outputs to the TrCH treating part 305-1 corresponding to this each - 305-n.

[0081]Next, operation of each TrCH treating part 305-1 - 305-n is explained on behalf of the 1st TrCH treating part 305-1.

[0082]In the radio frame bond part 306, combination to a part for the TTI cycle of the data row transmitted by the radio frame for 10 ms each is performed.

[0083]In the 1st Dinter leaving part 307, the block DEINTA reeve over between two or more radio frames is performed to the combination data in the radio frame bond part 306.

[0084]As opposed to the data by which the block DEINTA reeve was carried out in the RETODE matching part 308, Based on RM specified from the upper layer, operation returned to the data row in front of the rate matching of a transmitting agency is performed from the data row of TrCH mapped by TS25.212 to the physical channel of the dispersion ratio specified from the upper layer according to the rate matching algorithm of a statement.

[0085]In TrCH, since the data row of the maximum number of bits is always inputted, the variation of the number of bits before and after RETODE matching will perform only RETODE conducts matching to the case where the transmission data volume of per an interleave cycle (TTI) serves as the maximum.



[0086]In the DTX bit cutout 309, when the number of bits of the TrCH data from the RETODE matching part 308 is less than the maximum, it considers that a part for the number of bits of the difference is a DTX bit, and it is deleted.

[0087]Here, the number of bits before DTX bit deletion of TrCH data becomes always equal to the number of bits in TF from which the number of TB size  $\times$  TB serves as the maximum.

[0088]In the Viterbi decoding part 310, Viterbi decoding processing (coding rates 1/3) to the data row from the DTX bit cutout 309 is performed. At this time, 8 bits of ends of a data row are treated as a tail bit.

[0089]In the TB separation part 311, the data row of TrCH decoded by the Viterbi decoding part 310 is divided into TB unit.

[0090]In the CRC judgment part 312, CRC bit decision processing to TB from the TB separation part 311 is performed. The 1st TrCH data is outputted by this.

[0091]here -- the -- the data flow in the RETODE matching part 308, the DTX bit cutout 309, and the Viterbi decoding part 310 which process the data of iTrCH is shown in drawing 4, and the explanation is given.

[0092]In the RETODE matching part 308, since  $N_i$  shown in drawing 4 (a),  $\max \times 3 + \Delta N_i$ , and  $\max$  become an input bit number in common to all the TF, only bit manipulation which is set to  $(N_i, \max \times 3)$  is performed.

[0093]In the DTX bit cutout 309, as shown in (b), the DTX bit for [ used as  $N_i$  and  $DTX = (N_i, \max \times 3) - (N_i, j \times 3)$  ] the number of bits is deleted.

[0094]To the Viterbi decoding processing in the Viterbi decoding part 310, as shown in (c), the data row of  $N_i$  and  $j \times 3$  is inputted, and as shown in (d), the data row of  $N_i$  and  $j$  is obtained as an output after an error correction (a tail bit is included).

[0095]Thus, according to the data receiver of Embodiment 2, it counters with the data source of the above-mentioned Embodiment 1, DTX bit deletion is performed after RETODE conducts matching, and it was made to perform decoding processing for an error correction.

[0096]By this, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, RETODE conducts matching can always be performed to the bit length of certain size. Increase of a throughput can be prevented by this.

[0097]In performing BTFD which used CRC of the statement for Annex A.1.2 of TS25.212 especially, Since it is not necessary to perform RETODE conducts matching for every number of transmitted bits of the TTI cycle corresponding to all the TF which TrCH of a determination object can take, the amount of receptions is reducible.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1]The block diagram showing the composition of the data source concerning the embodiment of the invention 1

[Drawing 2]The data flow diagram for explaining operation of the data transmission processing by the data source concerning Embodiment 1

[Drawing 3]The block diagram showing the composition of the data receiver concerning the embodiment of the invention 2

[Drawing 4]The data flow diagram for explaining operation of the data receiving processing by the data receiver concerning Embodiment 2

[Drawing 5]The block diagram showing the composition of the conventional data source

[Drawing 6] The data flow diagram for explaining operation of the data transmission processing by the conventional data source

[Description of Notations]

100-1 - 100-n -- the [ the 1st - ] -- a nTrCH treating part

101 CRC adjunct

102 TB bond part

103 Convolutional code-ized part

104 DTX bit inserting part

105 Rate matching part

106 The 1st interleaving part

107 Radio frame dividing part

108 TrCH multiplexing part

109 Physical channel dividing part

110 The 2nd interleaving part

111 Physical channel-mapping part

301 Physical channel demapping part

302 The 2nd Dinter leaving part

303 Physical channel bond part

304 TrCH separation part

305-1 - 305-n -- the [ the 1st - ] -- a nTrCH treating part

306 Radio frame bond part

307 The 1st Dinter leaving part

308 RETODE matching part

309 DTX bit cutout

310 Viterbi decoding part

311 TB separation part

312 CRC judgment part

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[Translation done.]

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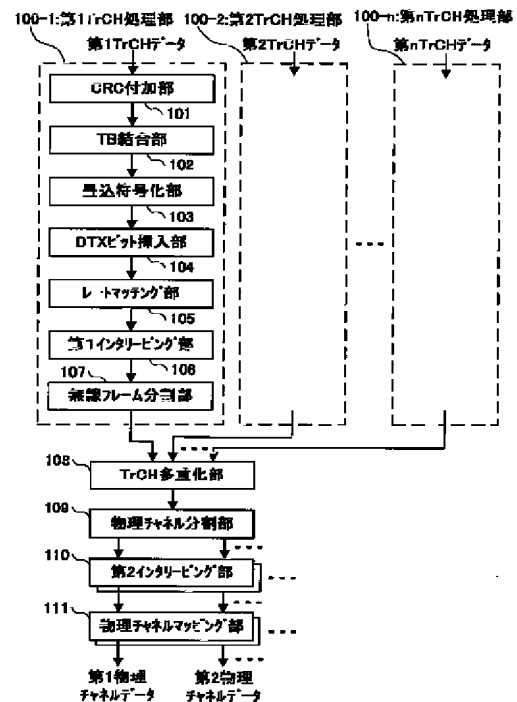
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(54) 【発明の名称】 データ送信装置とデータ受信装置及びデータ送信方法とデータ受信方法

(57) 【要約】

【課題】 トランスポートチャネルで伝送されるトランスポートブロック数やトランスポートブロックサイズが変化しても、常時一定サイズのビット長に対してレートマッチング処理を行うことができ、これによって処理量の増大を防止すること。

【解決手段】 CRC付加部101から畳込符号化部103において、トランスポートチャネルデータ(TrCHデータ)に誤り訂正のための符号化処理を行う。DTXビット挿入部104で、符号化処理後のTrCHデータのビット数が予め定められた最大値に満たない場合に、その差分のビット数を埋めるためのDTXビットをTrCHデータに挿入する。レートマッチング部105で、上位レイヤ指定の拡散率の物理チャネルに、上記挿入後のTrCHデータをマッピングするビット数を決定する。物理チャネルマッピング部111で、上記ビット数に応じたTrCHデータを物理チャネル上にマッピングする。



## 【特許請求の範囲】

【請求項1】 複数のトランスポートチャネルデータに、誤り訂正のための符号化処理を行う手段と、前記符号化処理後のトランスポートチャネルデータのビット数が予め定められた最大値に満たない場合に、その差分のビット数を埋めるためのD T Xビットをトランスポートチャネルデータに挿入する手段と、上位レイヤから指定された拡散率の物理チャネルに、前記挿入後のトランスポートチャネルデータをマッピングするビット数を決定するレートマッチングを行う手段と、前記ビット数に応じたトランスポートチャネルデータを物理チャネル上にマッピングする手段と、を具備することを特徴とするデータ送信装置。

【請求項2】 トランスポートチャネルデータに、誤り訂正のための符号化処理を行う手段と、前記符号化処理後の各々のトランスポートチャネルデータにおいて、このデータのビット数が予め定められた最大値に満たない場合に、その差分のビット数を埋めるためのD T Xビットをトランスポートチャネルデータに挿入する手段と、上位レイヤから指定された各々のトランスポートチャネルの重みに基づき、前記上位レイヤから指定された拡散率の物理チャネルに、前記挿入後の各々のトランスポートチャネルデータをマッピングするビット数を決定するレートマッチングを行う手段と、この手段から出力される各々のトランスポートチャネルデータを多重化する手段と、前記ビット数に応じた多重化後のトランスポートチャネルデータを物理チャネル上にマッピングする手段と、を具備することを特徴とするデータ送信装置。

【請求項3】 請求項1記載のデータ送信装置においてマッピングされたトランスポートチャネルデータを、前記データ送信装置におけるレートマッチング前のデータに戻すレートデマッチングを行う手段と、前記レートデマッチング後のトランスポートチャネルデータのビット数が予め定められた最大値に満たない場合、その差分のビット数をD T Xビットと見なして削除する手段と、この手段から出力されるトランスポートチャネルデータに、誤り訂正のための復号処理を行う手段と、を具備することを特徴とするデータ受信装置。

【請求項4】 請求項2記載のデータ送信装置においてマッピングされたトランスポートチャネルデータを分離する手段と、この手段で分離された各々のトランスポートチャネルを、上位レイヤから指定された各々のトランスポートチャネルの重みに基づき、前記データ送信装置におけるレートマッチング前のデータに戻すレートデマッチングを行う手段と、前記レートデマッチング後の各々のトランスポートチャネルデータのビット数が予め定められた最大値に満たない場合、その差分のビット数をD T Xビットと見なして削除する手段と、この手段から出力される各々のトランスポートチャネルデータに、誤り訂正のための復号処理を行う手段と、を具備すること

を特徴とするデータ受信装置。

【請求項5】 請求項1又は請求項2記載のデータ送信装置を具備することを特徴とする基地局装置。

【請求項6】 請求項3又は請求項4記載のデータ受信装置を具備することを特徴とする移動局装置。

【請求項7】 複数のトランスポートチャネルデータに誤り訂正のための符号化処理を行い、この処理後のトランスポートチャネルデータのビット数が予め定められた最大値に満たない場合に、その差分のビット数を埋めるためのD T Xビットをトランスポートチャネルデータに挿入し、この挿入後のトランスポートチャネルデータを上位レイヤから指定された拡散率の物理チャネルにマッピングするビット数を決定するレートマッチングを行い、前記ビット数に応じたトランスポートチャネルデータを物理チャネル上にマッピングすることを特徴とするデータ送信方法。

【請求項8】 請求項7記載のデータ送信方法においてマッピングされたトランスポートチャネルデータを、前記データ送信方法におけるレートマッチング前のデータに戻すレートデマッチングを行い、このレートデマッチング後のトランスポートチャネルデータのビット数が予め定められた最大値に満たない場合、その差分のビット数をD T Xビットと見なして削除し、この削除処理を経たトランスポートチャネルデータに、誤り訂正のための復号処理を行うことを特徴とするデータ受信方法。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、CDMA (Code Division Multiple Access) 方式が適用された移動体通信システムにおける自動車電話機・携帯電話機や携帯電話機能及びコンピュータ機能を備えた情報通信端末装置等の移動局装置、及び移動局装置と無線通信を行う基地局装置等に適用されるデータ送信装置とデータ受信装置及びデータ送信方法とデータ受信方法に関する。

## 【0002】

【従来の技術】第3世代の移动通信システムにおけるチャネルコーディング方法は、3GPPのTS 25.212に記載されたものが知られている。下り回線のチャネルコーディングについては、複数のTransport channel (以下T r C Hと表記) を多重化する際の位置を固定とするfixed positionという技術と、位置を可変とするflexible positionという技術とが知られている。

【0003】基地局装置からの下り回線信号を受信する移動局装置において、受信した複数T r C Hの組み合わせと、各T r C Hのフォーマット (Transport blockのサイズやTransport blockの多重数など) を明示的な情報なしに判定するBlind Transport format detection (以下B T F Dと表記) を行うには、fixed positionを適用した方が受信処理を容易にすることができる。

【0004】図5は、従来のデータ送信装置の構成を示

すブロック図である。

【0005】この図5に示すデータ送信装置は、fixed positionの場合の下りチャネルコーディング処理を行うものである。但し、以下の説明では、誤り訂正の符号化処理として、符号化率 $1/3$ の畳み込み符号化処理が適用された場合を示すが、符号化率 $1/2$ の畳み込み符号化処理や、符号化率 $1/3$ のTurbo符号化処理が適用された場合も同様である。

【0006】このデータ送信装置では、第1～第 $n$  TrCHデータの各々に対して、同一構成の第1～第 $n$  TrCH処理部500-1～500- $n$ の各々において、CRC付加部501、TB (Transport block) 結合部502、畳込符号化部503、レートマッチング部504、DTXビット挿入部505、第1インタリーブ部506及び無線フレーム分割部507で、後述で説明する処理を行う。この後、TrCH多重化部508でTrCH多重化を行い、単一のデータ列として、物理チャネル分割部509、第2インタリーブ部510及び物理チャネルマッピング部511で、後述で説明する処理を行う。

【0007】まず、第1～第 $n$  TrCH処理部500-1～500- $n$ の動作を、第1 TrCH処理部500-1を代表して説明する。

【0008】CRC付加部501では、TrCHデータにおける各TBに対するCRCビットの付加が行われる。

【0009】TB結合部502では、CRC付加部501でCRCビットが付加されたTBを、単一のデータ列へと結合する。

【0010】畳込符号化部503では、TB結合部502からのデータ列に8ビットのtailビットを付加した後、符号化率 $1/3$ の畳み込み符号化処理を行う。

【0011】レートマッチング部504では、上位レイヤから指定されたRM (Rate matching attribute) に基づき、上位レイヤから指定された拡散率の物理チャネルに、TrCHデータ列をマッピングするビット数を決定する。

【0012】この決定されたビット数は、物理チャネルマッピング部511でのマッピングで用いられる。レートマッチングアルゴリズムは、TS 25.212に記載されたものに従うものとする。

【0013】レートマッチングの前後におけるビット数の変化量は、TrCHデータにおいて、インタリーブ周期 {TTI (Transmission Time Interval)} 当たりの伝送データ量が最大となる場合を基準にして決定され、例えば、第 $i$  TrCHデータのTTI 当たりの伝送データ量 $N_{i, \text{TTI}}$ に対するレートマッチング後のデータ量 $R(N_{i, \text{TTI}})$ は、 $R(N_{i, \text{TTI}})/N_{i, \text{TTI}}=C_i$ となるようなビット数が出力される。

【0014】DTXビット挿入部505では、TrCH

データのレートマッチング後のビット数が、最大値に満たなかった場合に、その差分のビット数分をDTX (Discontinuous Transmission) ビットとして挿入する。

【0015】第1インタリーブ部506では、DTXビット挿入部505からのTrCHデータに対して、複数無線フレーム間にわたるブロックインタリーブを行う。

【0016】無線フレーム分割部507では、各10msの無線フレームで伝送するデータ列毎への分割を行う。

【0017】このように第1～第 $n$  TrCH処理部500-1～500- $n$ で処理された各TrCHデータが、TrCH多重化部508へ出力される。

【0018】TrCH多重化部508では、各TrCHデータの多重化処理を行う。

【0019】物理チャネル分割部509では、多重化データに対して、マルチコード伝送を行う場合の各コードへの伝送データの分割を行う。

【0020】第2インタリーブ部510では、物理チャネル分割部509からの出力データに対して、10ms内で伝送するデータ内でのブロックインタリーブを行う。

【0021】物理チャネルマッピング部511では、第2インタリーブ部510からのデータ列を、上記ビット数に応じて物理チャネル上へ配置する。

【0022】ここで、第 $i$  TrCHデータを処理する畳込符号化部503、レートマッチング部504及びDTXビット挿入部505におけるデータフローを図6に示し、その説明を行う。

【0023】畳込符号化部503における畳み込み符号化処理に対して、TBのサイズ、TBの多重数などで定まるTF (Transport Format) =  $j$  のときに入力されるビット数を、図6 (a) に示すように、 $N_{i, j}$ とする。

【0024】ここで、 $N_{i, j}$ は、tailビットを含むものとする。このとき、畳込符号化部503からは、(b) に示すように、 $N_{i, j} \times 3$ のビット列が出力される。

【0025】レートマッチング部504におけるレートマッチング処理では、(c) に示すように、 $(N_{i, j} \times 3) \times C_i = (N_{i, j} \times 3) + \Delta N_{i, j}$ となるようなビット操作がTF毎に行われる。

【0026】DTXビット挿入部505では、(d) に示すように、 $N_{i, \text{DTX}} = (N_{i, \text{max}} \times 3) + \Delta N_{i, \text{max}} - (N_{i, j} \times 3) + \Delta N_{i, j}$ となるビット数分のDTXビットが挿入される。

【0027】

【発明が解決しようとする課題】しかしながら、従来の装置においては、各TrCHのTF毎に異なるビット数のデータ列に対して、それぞれに異なるパターンのレートマッチング処理を行う必要があるため、処理量が増大してしまうという問題がある。

【0028】特に、下り回線の受信処理におけるチャネルデコーディングにおいてBTFDを実行する場合に、全TFに対応するレートデマッチング処理を行う必要があるため、処理量が増大してしまう。

【0029】本発明はかかる点に鑑みてなされたものであり、トランスポートチャネルで伝送されるトランスポートブロック数やトランスポートブロックサイズが変化しても、常時一定サイズのビット長に対してレートマッチング処理を行うことができ、これによって処理量の増大を防止することができるデータ送信装置とデータ受信装置及びデータ送信方法とデータ受信方法を提供することを目的とする。

【0030】

【課題を解決するための手段】本発明のデータ送信装置は、複数のトランスポートチャネルデータに、誤り訂正のための符号化処理を行う手段と、前記符号化処理後のトランスポートチャネルデータのビット数が予め定められた最大値に満たない場合に、その差分のビット数を埋めるためのDTXビットをトランスポートチャネルデータに挿入する手段と、上位レイヤから指定された拡散率の物理チャネルに、前記挿入後のトランスポートチャネルデータをマッピングするビット数を決定するレートマッチングを行う手段と、前記ビット数に応じたトランスポートチャネルデータを物理チャネル上にマッピングする手段と、を具備する構成を採る。

【0031】この構成によれば、トランスポートチャネルで伝送されるトランスポートブロック数やトランスポートブロックサイズが変化しても、常時一定サイズのビット長に対してレートマッチング処理を行うことができ、これによって処理量の増大を防止することができる。

【0032】本発明のデータ送信装置は、トランスポートチャネルデータに、誤り訂正のための符号化処理を行う手段と、前記符号化処理後の各々のトランスポートチャネルデータにおいて、このデータのビット数が予め定められた最大値に満たない場合に、その差分のビット数を埋めるためのDTXビットをトランスポートチャネルデータに挿入する手段と、上位レイヤから指定された各々のトランスポートチャネルの重みに基づき、前記上位レイヤから指定された拡散率の物理チャネルに、前記挿入後の各々のトランスポートチャネルデータをマッピングするビット数を決定するレートマッチングを行う手段と、この手段から出力される各々のトランスポートチャネルデータを多重化する手段と、前記ビット数に応じた多重化後のトランスポートチャネルデータを物理チャネル上にマッピングする手段と、を具備する構成を採る。

【0033】この構成によれば、トランスポートチャネルで伝送されるトランスポートブロック数やトランスポートブロックサイズが変化しても、常時一定サイズのビット長に対してレートマッチング処理を行うことができ、

これによって処理量の増大を防止することができる。

【0034】本発明のデータ受信装置は、上記構成のデータ送信装置においてマッピングされたトランスポートチャネルデータを、前記データ送信装置におけるレートマッチング前のデータに戻すレートデマッチングを行う手段と、前記レートデマッチング後のトランスポートチャネルデータのビット数が予め定められた最大値に満たない場合、その差分のビット数をDTXビットと見なし、削除する手段と、この手段から出力されるトランスポートチャネルデータに、誤り訂正のための復号処理を行う手段と、を具備する構成を採る。

【0035】この構成によれば、トランスポートチャネルで伝送されるトランスポートブロック数やトランスポートブロックサイズが変化しても、常時一定サイズのビット長に対してレートデマッチング処理を行うことができ、これによって処理量の増大を防止することができる。

【0036】本発明のデータ受信装置は、上記構成のデータ送信装置においてマッピングされたトランスポートチャネルデータを分離する手段と、この手段で分離された各々のトランスポートチャネルを、上位レイヤから指定された各々のトランスポートチャネルの重みに基づき、前記データ送信装置におけるレートマッチング前のデータに戻すレートデマッチングを行う手段と、前記レートデマッチング後の各々のトランスポートチャネルデータのビット数が予め定められた最大値に満たない場合、その差分のビット数をDTXビットと見なし、削除する手段と、この手段から出力される各々のトランスポートチャネルデータに、誤り訂正のための復号処理を行う手段と、を具備する構成を採る。

【0037】この構成によれば、トランスポートチャネルで伝送されるトランスポートブロック数やトランスポートブロックサイズが変化しても、常時一定サイズのビット長に対してレートデマッチング処理を行うことができ、これによって処理量の増大を防止することができる。

【0038】本発明の基地局装置は、上記いずれかと同構成のデータ送信装置を具備する構成を採る。

【0039】この構成によれば、基地局装置において、上記いずれかと同構成のデータ送信装置と同様の作用効果を得ることができる。

【0040】本発明の移動局装置は、上記いずれかと同構成のデータ受信装置を具備する構成を採る。

【0041】この構成によれば、移動局装置において、上記いずれかと同構成のデータ受信装置と同様の作用効果を得ることができる。

【0042】本発明のデータ送信方法は、複数のトランスポートチャネルデータに誤り訂正のための符号化処理を行い、この処理後のトランスポートチャネルデータの

ビット数が予め定められた最大値に満たない場合に、その差分のビット数を埋めるためのDTXビットをトランスポートチャネルデータに挿入し、この挿入後のトランスポートチャネルデータを上位レイヤから指定された拡散率の物理チャネルにマッピングするビット数を決定するレートマッチングを行い、前記ビット数に応じたトランスポートチャネルデータを物理チャネル上にマッピングするようにした。

【0043】この方法によれば、トランスポートチャネルで伝送されるトランスポートブロック数やトランスポートブロックサイズが変化しても、常時一定サイズのビット長に対してレートマッチング処理を行うことができ、これによって処理量の増大を防止することができる。

【0044】本発明のデータ受信方法は、上記のデータ送信方法においてマッピングされたトランスポートチャネルデータを、前記データ送信方法におけるレートマッチング前のデータに戻すレートデマッチングを行い、このレートデマッチング後のトランスポートチャネルデータのビット数が予め定められた最大値に満たない場合、その差分のビット数をDTXビットと見なして削除し、この削除処理を経たトランスポートチャネルデータに、誤り訂正のための復号処理を行うようにした。

【0045】この方法によれば、トランスポートチャネルで伝送されるトランスポートブロック数やトランスポートブロックサイズが変化しても、常時一定サイズのビット長に対してレートデマッチング処理を行うことができ、これによって処理量の増大を防止することができる。

【0046】

【発明の実施の形態】以下、本発明の実施の形態について、図面を参照して詳細に説明する。

【0047】（実施の形態1）図1は、本発明の実施の形態1に係るデータ送信装置の構成を示すブロック図である。

【0048】この図1に示すデータ送信装置は、fixed positionの場合の下りチャネルコーディング処理を行うものである。但し、以下の説明では、誤り訂正の符号化処理として、符号化率 $1/3$ の畳み込み符号化処理が適用された場合を示すが、符号化率 $1/2$ の畳み込み符号化処理や、符号化率 $1/3$ のTurbo符号化処理が適用された場合も同様である。

【0049】このデータ送信装置では、第1～第 $n$ TrCHデータの各々に対して、同一構成の第1～第 $n$ TrCH処理部 $100-1 \sim 100-n$ の各々において、CRC付加部101、TB結合部102、畳込符号化部103、DTXビット挿入部104、レートマッチング部105、第1インタリーブ部106及び無線フレーム分割部107で、後述で説明する処理を行う。

【0050】この後、TrCH多重化部108でTrC

H多重化を行い、単一のデータ列として、物理チャネル分割部109、第2インタリーブ部110及び物理チャネルマッピング部111で、後述で説明する処理を行う。

【0051】まず、第1～第 $n$ TrCH処理部 $100-1 \sim 100-n$ の動作を、第1TrCH処理部 $100-1$ を代表して説明する。

【0052】CRC付加部101では、TrCHデータにおける各TBに対するCRCビットの付加が行われる。

【0053】TB結合部102では、CRC付加部101でCRCビットが付加されたTBを、単一のデータ列へと結合する。

【0054】畳込符号化部103では、TB結合部102からのデータ列に8ビットのtailビットを付加した後、符号化率 $1/3$ の畳み込み符号化処理を行う。

【0055】DTXビット挿入部104では、畳込符号化部103からのTrCHデータのビット数が、最大値に満たなかった場合に、その差分のビット数分をDTXビットとして挿入する。このため、TrCHデータのDTXビット挿入後のビット数は、TBサイズ×TB数が最大となるTFにおけるビット数と常に等しくなる。

【0056】レートマッチング部105では、上位レイヤから指定されたRMに基づき、上位レイヤから指定された拡散率の物理チャネルに、TrCHデータ列をマッピングするビット数を決定する。

【0057】この決定されたビット数は、物理チャネルマッピング部111でのマッピングで用いられる。レートマッチングアルゴリズムはTS25.212に記載されたものに従うものとする。

【0058】レートマッチングの前後におけるビット数の変化量は、TrCHにおいて、常に最大ビット数相当のデータ列が入力されるので、第1インタリーブ周期(TTI)当たりの伝送データ量が最大となる場合に対するレートマッチング処理のみを行うことになる。

【0059】第1インタリーブ部106では、レートマッチング部105からのTrCHデータに対して、複数無線フレーム間にわたるブロックインタリーブを行う。

【0060】無線フレーム分割部107では、各10msの無線フレームで伝送するデータ列毎への分割を行う。

【0061】このように第1～第 $n$ TrCH処理部 $100-1 \sim 100-n$ で処理された各TrCHデータが、TrCH多重化部108へ出力される。

【0062】TrCH多重化部108では、各TrCHデータの多重化処理を行う。

【0063】物理チャネル分割部109では、多重化データに対して、マルチコード伝送を行う場合の各コードへの伝送データの分割を行う。

【0064】第2インタリービング部110では、物理チャネル分割部109からの出力データに対して、10ms内で伝送するデータ内でのブロックインタリーブを行う。

【0065】物理チャネルマッピング部111では、第2インタリービング部110からのデータ列を、上記ビット数に応じて物理チャネル上へ配置する。

【0066】ここで、第 $i$  TrCHデータを処理する畳込符号化部103、DTXビット挿入部104及びレートマッチング部105におけるデータフローを図2に示し、その説明を行う。

【0067】畳込符号化部103における畳み込み符号化処理に対して、TBのサイズ、TBの多重数などで定まる $TF=j$ のときに入力されるビット数を、図2(a)に示すように、 $N_{i,j}$ とする。

【0068】ここで、 $N_{i,j}$ は、tailビットを含むものとする。このとき、畳込符号化部103からは、(b)に示すように、 $N_{i,j} \times 3$ のビット列が出力される。

【0069】DTXビット挿入部104では、(c)に示すように、 $N_{i,DTX} = (N_{i,max} \times 3) - (N_{i,j} \times 3)$ となるビット数分のDTXビットが挿入される。

【0070】レートマッチング部105では、全TFに対して共通に $N_{i,max} \times 3$ が入力ビット数となるので、(d)に示すように、 $(N_{i,max} \times 3) + \Delta N_{i,max}$ となるようなビット操作のみ行われる。

【0071】このように、実施の形態1のデータ送信装置によれば、トランスポートチャネルの多重化を、fixed positionにて行う下り回線のチャネルコーディングにおいて、誤り訂正のための符号化処理後に、まずDTXビット挿入処理を行い、その後にレートマッチング処理を行うようにした。

【0072】これによって、トランスポートチャネルで伝送されるトランスポートブロック数やトランスポートブロックサイズが変化しても、常時一定サイズのビット長に対してレートマッチング処理を行うことができる。これによって処理量の増大を防止することができる。

【0073】(実施の形態2)図3は、本発明の実施の形態2に係るデータ受信装置の構成を示すブロック図である。

【0074】この図3に示すデータ受信装置は、fixed positionの場合の下りチャネルデコーディング方法を示す。但し、以下の説明では、誤り訂正の符号化処理として、符号化率 $1/3$ の畳み込み符号化処理が適用された場合を示すが、符号化率 $1/2$ の畳み込み符号化処理や、符号化率 $1/3$ のTurbo符号化処理が適用された場合も同様である。

【0075】このデータ受信装置では、上記実施の形態1のデータ送信装置から送信された各物理チャネルデータが受信され、物理チャネルデマッピング部301、第2デインタリービング部302、物理チャネル結合部3

03及びTrCH分離部304で後述で説明する処理が行われ、同一構成の第1～第 $n$  TrCH処理部305-1～305- $n$ へ出力される。

【0076】そして、各々のTrCH処理部305-1～305- $n$ において、無線フレーム結合部306、第1デインタリービング部307、レートデマッチング部308、DTXビット削除部309、ピタビ復号部310、TB分離部311及びCRC判定部312で後述で説明する処理が行われ、第1～第 $n$  TrCHデータが出力されるようになっている。

【0077】物理チャネルデマッピング部301では、各物理チャネル上からデータ列を抽出する。

【0078】第2デインタリービング部302では、物理チャネルデマッピング部301からの出力データに対して、10ms内で伝送するデータ内でのブロックデインタリーブを行う。

【0079】物理チャネル結合部303では、マルチコード伝送を行う場合の各コードから、ブロックデインタリーブされた伝送データの結合を行う。

【0080】TrCH分離部304では、物理チャネル結合部303で結合されたデータを、第1～第 $n$  TrCHデータに分離し、この各々に対応するTrCH処理部305-1～305- $n$ へ出力する。

【0081】次に、各TrCH処理部305-1～305- $n$ の動作を、第1 TrCH処理部305-1を代表して説明する。

【0082】無線フレーム結合部306では、各10msの無線フレームで伝送されたデータ列のTTI周期への結合を行う。

【0083】第1デインタリービング部307では、無線フレーム結合部306での結合データに対して、複数無線フレーム間にわたるブロックデインタリーブを行う。

【0084】レートデマッチング部308では、ブロックデインタリーブされたデータに対して、上位レイヤから指定されたRMに基づき、上位レイヤから指定された拡散率の物理チャネルへ、TS25.212に記載のレートマッチングアルゴリズムに従ってマッピングされたTrCHのデータ列から、送信元のレートマッチング前のデータ列に戻す操作を行う。

【0085】レートデマッチングの前後におけるビット数の変化量は、TrCHにおいて、常に最大ビット数相当のデータ列が入力されるので、インタリーブ周期(TTI)当たりの伝送データ量が最大となる場合に対するレートデマッチング処理のみを行うことになる。

【0086】DTXビット削除部309では、レートデマッチング部308からのTrCHデータのビット数が、最大値に満たなかった場合に、その差分のビット数分をDTXビットとみなして削除する。

【0087】ここで、TrCHデータのDTXビット削



除前のビット数は、TBサイズ×TB数が最大となるTFにおけるビット数と常に等しくなる。

【0088】ビタビ復号部310では、DTXビット削除部309からのデータ列に対するビタビ復号処理（符号化率 $1/3$ ）を行う。このとき、データ列の末尾8ビットはtailビットとして扱う。

【0089】TB分離部311では、ビタビ復号部310で復号されたTrCHのデータ列をTB単位へと分離する。

【0090】CRC判定部312では、TB分離部311からのTBに対するCRCビット判定処理を行う。これによって、第1TrCHデータが出力される。

【0091】ここで、第iTrCHのデータを処理するレートデマッチング部308、DTXビット削除部309及びビタビ復号部310におけるデータフローを図4に示し、その説明を行う。

【0092】レートデマッチング部308では、全TFに対して共通に、図4(a)に示す $N_{i,max} \times 3 + \Delta N_{i,max}$ が入力ビット数となるので、 $(N_{i,max} \times 3)$ となるようなビット操作のみ行われる。

【0093】DTXビット削除部309では、(b)に示すように、 $N_{i,DTX} = (N_{i,max} \times 3) - (N_{i,j} \times 3)$ となるビット数分のDTXビットが削除される。

【0094】ビタビ復号部310でのビタビ復号処理に対して、(c)に示すように、 $N_{i,j} \times 3$ のデータ列が入力され、誤り訂正後の出力として、(d)に示すように、 $N_{i,j}$ のデータ列が得られる（tailビットを含む）。

【0095】このように、実施の形態2のデータ受信装置によれば、上記実施の形態1のデータ送信装置と対向して、レートデマッチング処理後にDTXビット削除処理を行い、誤り訂正のための復号処理を行うようにした。

【0096】これによって、トランスポートチャネルで伝送されるトランスポートブロック数やトランスポートブロックサイズが変化しても、常時一定サイズのビット長に対してレートデマッチング処理を行うことができる。これによって処理量の増大を防止することができる。

【0097】特に、TS25.212のAnnex A.1.2に記載のCRCを利用したBTFDを実行する場合には、判定対象のTrCHが取り得る全てのTFに対応したTTI周期の伝送ビット数毎にレートデマッチング処理を行う必要がないため、受信処理量を削減することができる。

【0098】

【発明の効果】以上説明したように、本発明によれば、トランスポートチャネルで伝送されるトランスポートブロック数やトランスポートブロックサイズが変化しても、常時一定サイズのビット長に対してレートマッチング処理を行うことができ、これによって処理量の増大を防止することができる。

【図面の簡単な説明】

【図1】本発明の実施の形態1に係るデータ送信装置の構成を示すブロック図

【図2】実施の形態1に係るデータ送信装置によるデータ送信処理の動作を説明するためのデータフロー図

【図3】本発明の実施の形態2に係るデータ受信装置の構成を示すブロック図

【図4】実施の形態2に係るデータ受信装置によるデータ受信処理の動作を説明するためのデータフロー図

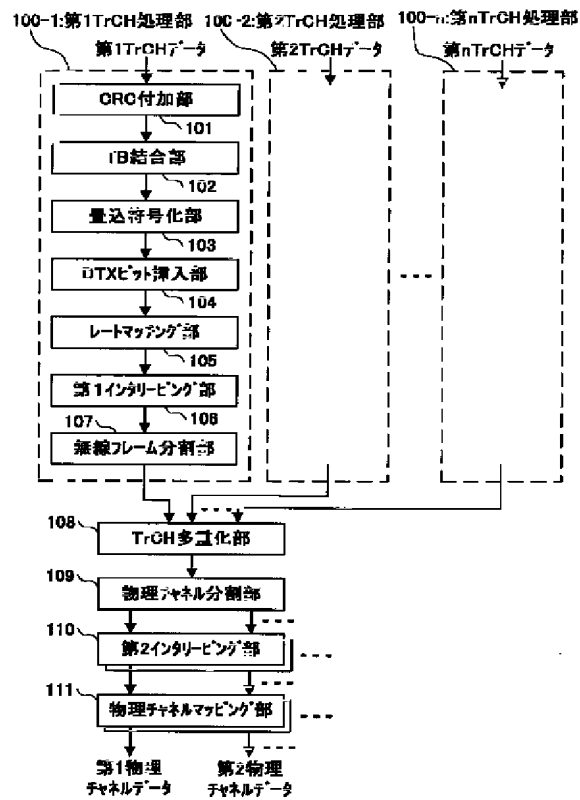
【図5】従来のデータ送信装置の構成を示すブロック図

【図6】従来のデータ送信装置によるデータ送信処理の動作を説明するためのデータフロー図

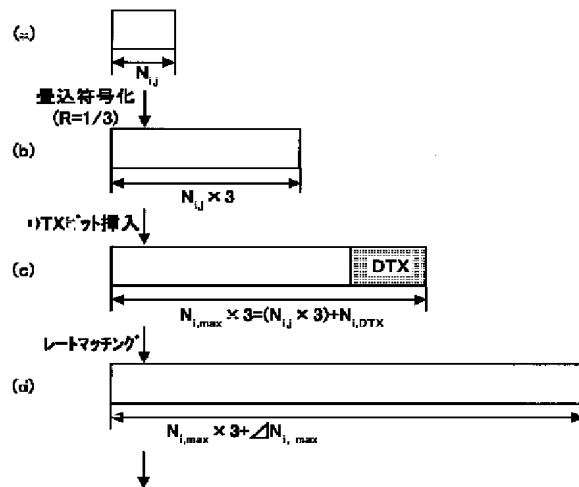
【符号の説明】

- 100-1～100-n 第1～第nTrCH処理部
- 101 CRC付加部
- 102 TB結合部
- 103 畳込符号化部
- 104 DTXビット挿入部
- 105 レートマッチング部
- 106 第1インタリービング部
- 107 無線フレーム分割部
- 108 TrCH多重化部
- 109 物理チャネル分割部
- 110 第2インタリービング部
- 111 物理チャネルマッピング部
- 301 物理チャネルデマッピング部
- 302 第2デインタリービング部
- 303 物理チャネル結合部
- 304 TrCH分離部
- 305-1～305-n 第1～第nTrCH処理部
- 306 無線フレーム結合部
- 307 第1デインタリービング部
- 308 レートデマッチング部
- 309 DTXビット削除部
- 310 ビタビ復号部
- 311 TB分離部
- 312 CRC判定部

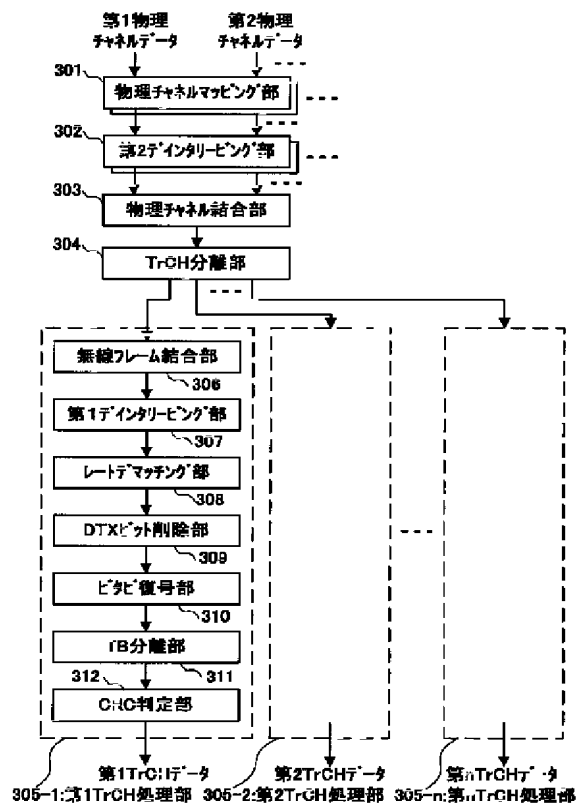
【図1】



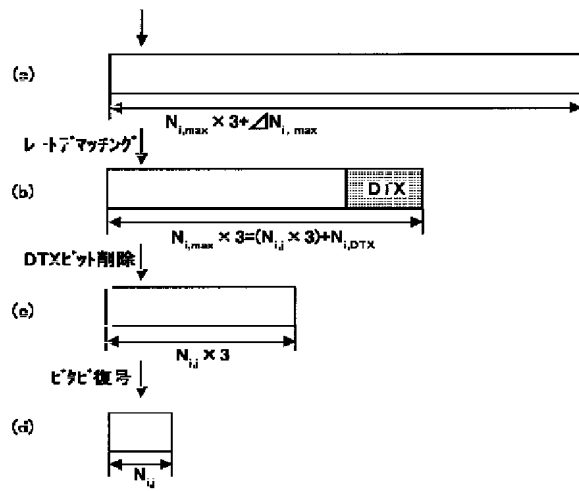
【図2】



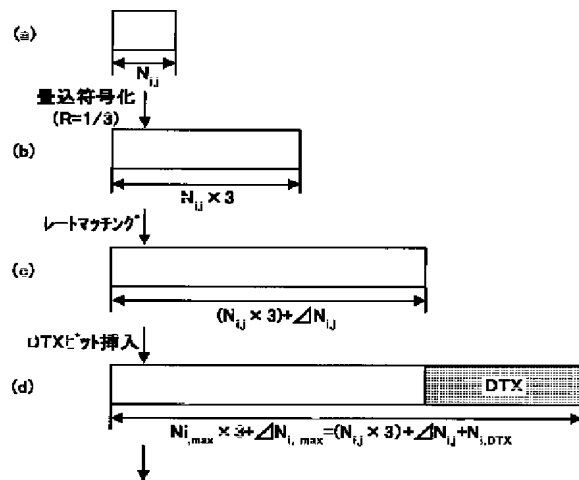
【図3】



【図4】



【図6】



【図5】

